

EduTutor AI: Personalized Learning with Generative AI and LMS Integration

Project description:

EduTutor AI is an AI-powered personalized education platform that revolutionizes the way students learn and educators assess progress. It provides dynamic quiz generation, student evaluation, Google Classroom integration, and real-time feedback—all powered by IBM Watsonx and Granite foundation models. Designed with modular architecture, this platform streamlines personalized education and enhances learning outcomes for students across academic levels.

Scenario 1: Personalized Learning Experience

A student logs into EduTutor AI and synchronizes their courses using their Google Classroom credentials. The platform analyzes course data, generates quizzes on key topics using the Granite LLM, and assesses responses for instant feedback—creating a highly personalized and engaging learning journey.

Scenario 2: Educator Dashboard & Performance Insights

Educators can log in to view real-time quiz performance of all students. The dashboard highlights quiz history, scores, last topics attempted, and insights fetched from the Pinecone vector database. This empowers teachers to monitor learning progress and personalize their instruction based on data.

Scenario 3: Diagnostic Testing and Adaptive Quizzing

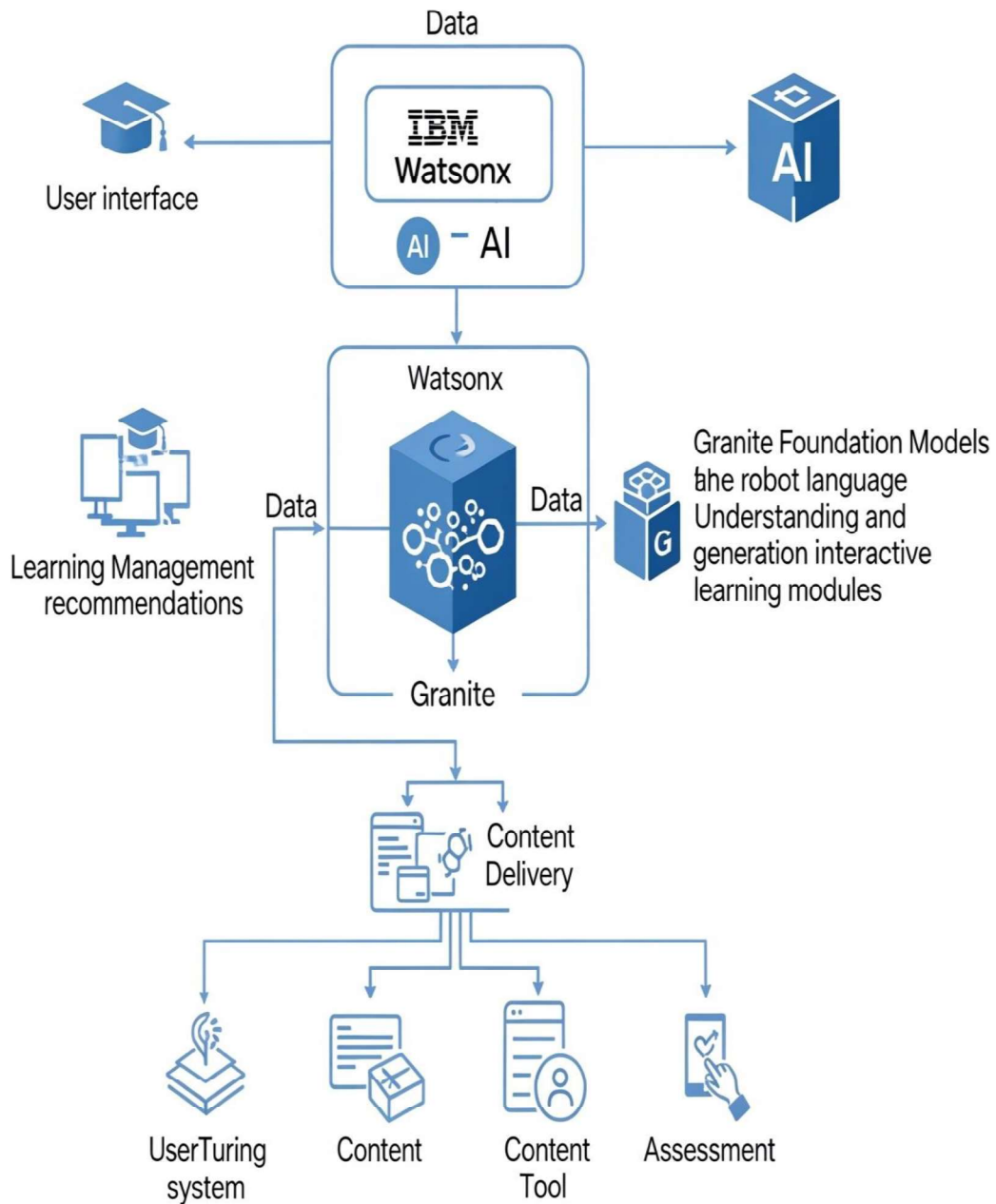
Upon registration, students undergo a diagnostic test generated by IBM Watsonx models. Based on the results, the platform adapts quiz difficulty and topic relevance, ensuring students are challenged at the right level.

Scenario 4: Google Integration Classroom

EduTutor AI syncs courses directly from Google Classroom, allowing seamless access to student data, class names, and subjects. This enables automatic quiz topic generation and helps maintain consistent alignment with the academic curriculum.

Architecture

EduTutor AI



project flow

- 1. User Input:**
Students log in using credentials or Google Classroom and request a quiz by selecting topic and difficulty.
- 2. AI Quiz Generation:**
Watsonx+Granite models generate MCQs, stored temporarily without answers in the frontend and with answers in the backend
- 3. User Quiz Submission:**
Students submit answers via UI. The backend evaluates the answers, scores the quiz, and stores it in Pinecone DB. But Some errors couldnt built the frontend part of it
- 4. Feedback Loop:**
- 5. 1. Educators access this data in the dashboard.**

Milestone 1: Requirements Specification

- **fastapi**
- **uvicorn**
- **langchain_ibm**
- **pinecone**
- **streamlit**
- **google-auth-oauthlib**
- **google-api-python-client**
- **python-dotenv**

Installation:

```
pip install -r requirements.txt
```

Requirements

- **fastapi**
- **uvicorn**
- **langchain_ibm**
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```

Milestone 2: Initialization of Environment Variables

Create a .env file with:

env

WATSONX_MODEL_ID=granite-13b-instruct-v2

WATSONX_API_KEY=your_ibm_watsonx_api_key

WATSONX_ENDPOINT=https://us-south.ml.cloud.ibm.com

WATSONX_PROJECT_ID=your_project_id

PINECONE_API_KEY=your_pinecone_api_key

PINECONE_INDEX_NAME=edututor

Milestone 3: AI Integration with IBM Watsonx

- **Model Setup:** Granite model is loaded via `langchain_ibm.WatsonxLLM`.
- **Prompt Template:** Dynamically generates quiz questions using LangChain's `PromptTemplate`.
- **Quiz Parsing:** Watsonx output is parsed into structured JSON for display and evaluation.

AI Integration with IBM Watsonx

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Milestone 4: Google Classroom Sync

- Uses `google-auth-oauthlib` and `google-api-python-client`.

User logs in via Google.

Google Classroom Sync

- **Uses google-auth-oauthlib and google-api-python-client.**
- **User logs in via Google.**

Milestone 5: Pinecone Vector DB Integration

- **Stores each user's profile with embeddings.**
- **Quiz metadata (score, topic, date) is updated after submission.**
- **Allows educators to fetch student data and analyze progress.**

Pinecone Vector DB Integration

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Milestone 6: Streamlit Frontend UI

- **Student Panel:**
 - **Login (Manual or Google)**
 - **Dashboard**
 - **Take Quiz**
 - **Quiz History**

- **Educator Panel:**
 - **Dashboard (all student analytics)**

Streamlit Frontend UI

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Milestone 7 : functional verification

Modular AI-Powered Architecture

- **FastAPI Backend**
Handles student/educator login, quiz generation, answer evaluation, classroom sync, and metadata updates.



User



POST /user/register Register User



Quiz



POST /quiz/generate Generate Quiz Endpoint



Google Auth



GET /auth/login Google Login



GET /auth/callback Google Auth Callback



Quiz Submission



POST /quiz/submit Submit Quiz



Educator



GET /educator/student/{user_id}/quiz-history Get Student Quiz History



- **+ Granite Models**
Generates MCQs dynamically from topic input. Provides instruction-tuned inference via LangChain Watsonx integration.

[Upgrade](#)
Rohan Patil's Account
Frankfurt

Train, deploy, validate, and govern AI models responsibly.

[Customize my journey](#)

[...]

Chat and build prompts with foundation models

Start chatting...

[Open Prompt Lab](#)

Build an AI agent to automate tasks

with Agent Lab

Tune a foundation model with labeled data

with Tuning Studio

Discover

[Collapse Discover section](#)

Developer access

Project or space: Edututor

Project ID: fc5db437-02d8-4bfd-adc8-f16c2fc1393e

watsonx.ai URL: https://eu-de.ml.cloud.ibm.com

Used to call watsonx.ai APIs such as LLM inferencing, embedding, training, and chatting.

[Create API key](#) [Manage IBM Cloud API keys](#)

Developer hub

New watsonx Developer Hub to start coding fast.

Make your first API request to inference a foundation model in watsonx.ai. Find the right foundation models and code libraries for your AI applications.

- Pinecone Vector DB**
 stores user profile embeddings, quiz history metadata, and similarity search for adaptive learning.

Indexes

[Create index](#)

Sort by last viewed
Filter by

Showing 1 index

edututor

...
Connect

Host: https://edututor-0cpwdt.svc.aped-4627-b74a.pinecone.io

Cloud: AWS • Region: us-east-1 • Type: Dense • Capacity mode: Serverless • Dimension: 2048 • Model: llama-text-embed-v2

[BROWSER](#) [METRICS](#) [NAMESPACES \(1\)](#) [CONFIGURATION](#)

Records Search List/Fetch Add a record

Namespace: (Default) Search by: Text Text: Example text Top K: 10 Search


+ Filter + Rerank

Showing 1 hit

1	ID: user123 last_quiz_id: "602af2fb-582e-450c-95b4-289dc0c7230c" last_score: 2 last_topic: "Photosynthesis" last_total: 19 last_updated: "2025-04-12T11:36:46.987775"	...
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- **Streamlit Frontend**
provides dashboards for both students and educators with role-based UI, quiz submission forms, and OAuth-based login.

Deploy

 **EduTutor AI Login**

Select Role

student

Enter User ID

Login

Or

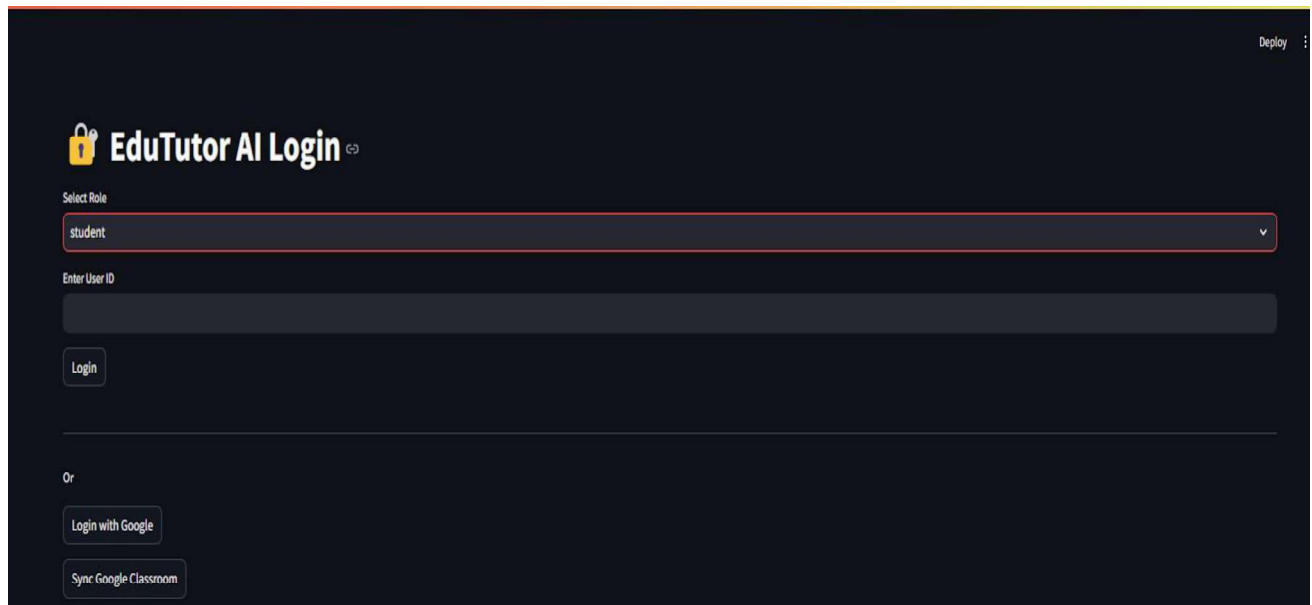
Login with Google

Sync Google Classroom

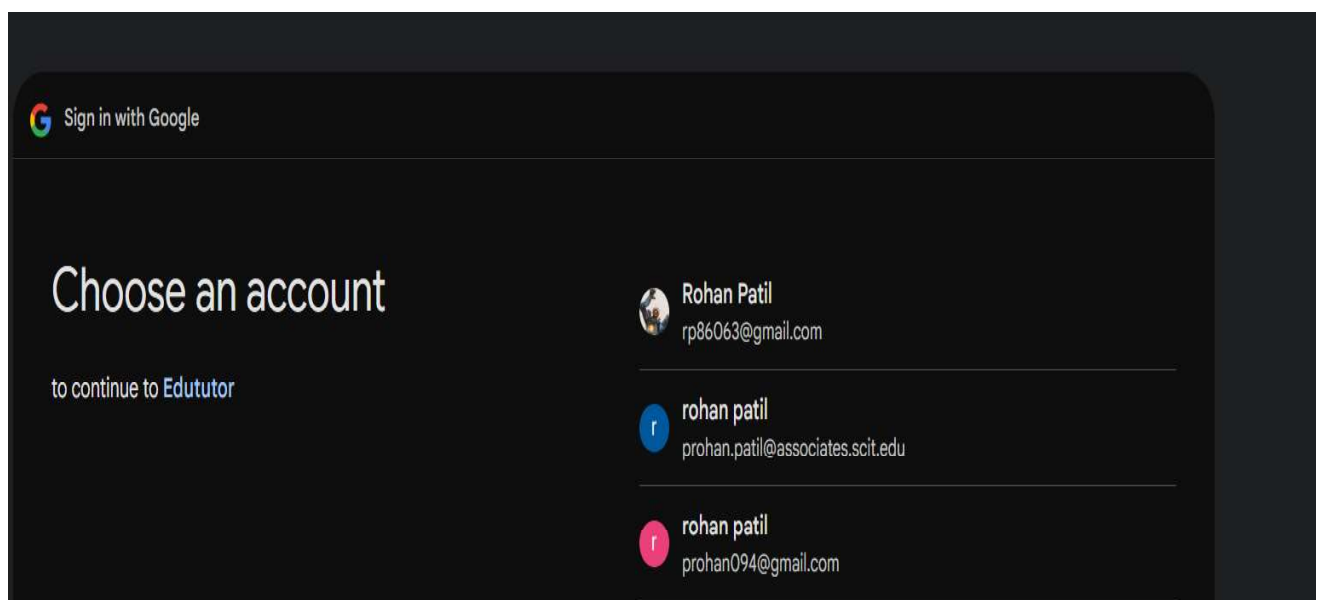
Project Flow:

1. User Input:

Students log in using credentials or Google Classroom and request a quiz by selecting topic and difficulty.



The image shows the 'EduTutor AI Login' interface. It features a dark blue background with a yellow padlock icon and the text 'EduTutor AI Login' in white. Below the title, there is a 'Select Role' dropdown menu with 'student' selected. Underneath is an 'Enter User ID' text input field. A 'Login' button is positioned below the input field. Further down, there is an 'Or' separator, followed by 'Login with Google' and 'Sync Google Classroom' buttons. A 'Deploy' button with a dropdown arrow is located in the top right corner.



The image shows a Google account selection screen. At the top, it says 'Sign in with Google' with the Google logo. Below this, the text 'Choose an account' is displayed in large white font, followed by 'to continue to Edututor' in smaller white font. On the right side, there are three account options, each with a circular profile picture and text: 'Rohan Patil' with email 'rp86063@gmail.com', 'rohan patil' with email 'prohan.patil@associates.scit.edu', and 'rohan patil' with email 'prohan094@gmail.com'.

2. AI Quiz Generation:

Watsonx+Granite models generate MCQs, stored temporarily without answers in the frontend and with answers in the backend.

localhost:8501

Deploy

EduTutor Navigation

Select a page

- Dashboard
- Take Quiz
- Quiz History

Take a Quiz

Enter Topic

PhotoSynthesis

Difficulty

easy

Number of Questions

1 5 10

Generate Quiz

Quiz generated. Answer the questions below!

Q2. The primary pigment involved in photosynthesis is...

- ☒ Chlorophyll a
- ☐ Chlorophyll b
- ☐ Carotene
- ☐ Xanthophyll

Q3. What is the main function of the stroma in plant cells during photosynthesis?

- ☒ It is the site of light-dependent reactions.
- ☐ It is the site of light-independent reactions (Calvin cycle).
- ☐ It stores excess glucose produced during photosynthesis.
- ☐ It is the site of cell division.

Q4. During photosynthesis, which gas is released as a byproduct?

- ☒ Oxygen
- ☐ Carbon dioxide
- ☐ Nitrogen
- ☐ Hydrogen

Q5. What is the role of water during the light-dependent reactions of photosynthesis?

- ☒ It provides electrons for the electron transport chain.
- ☐ It splits into hydrogen and oxygen, releasing oxygen as a byproduct.
- ☐ It is used to produce glucose through the Calvin cycle.

3. User Quiz Submission:

Students submit answers via UI. The backend evaluates the answers, scores the quiz, and stores it in Pinecone DB. But some errors couldn't build the frontend part of it

Showing 1 hit

1	ID: user123
	last_quiz_id: "02af2fb-582e-450c-95b4-289dc0c7230c"
	last_topic: "Photosynthesis"
	last_score: 2
SCORE	last_topic: "Photosynthesis"
0.0087	last_total: 19
	last_updated: "2025-04-12T11:36:46.987775"

4. Feedback Loop:

Educators access this data in the dashboard.